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New lichen records from Turkey – 2: *Aspicilia, Protoparmeliopsis,* and *Ramalina*

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Abstract— *Lecanora albosparsa* is lectotypified, the new combination *Protoparmeliopsis klauskalbii* is proposed, and three species of lichen-forming fungi — *Aspicilia albosparsa*, *P. klauskalbii,* and *Ramalina carpatica* — are reported as new to the lichen biota of Turkey

Key words— Afyon, *Ascomycetes*, Batman, Diyarbakır, Elazığ, İzmir, Şırnak, Uşak

Introduction

Examination of last century collections from Turkey in the herbaria of Vienna (W, WU) has revealed *Aspicilia albosparsa* and *Protoparmeliopsis klauskalbii* as species new to the Turkish lichen biota. These species and *Ramalina carpatica* have also been recently collected by the authors.

Materials & methods

Specimens deposited in W and WU were studied in Vienna, while the type specimens of *Aspicilia albosparsa*, deposited in BC, were studied in Barcelona. Fresh materials were collected from Afyon and Uşak provinces in 2009 and 2010 and deposited at the Aegean University Herbarium (EGE).

The samples were identified using a stereomicroscope, a compound microscope, and standard spot tests. Measurements were made on dry herbarium material or in microscopic preparations in tap water. Hand sections were mounted in water or in lactophenol-cotton-blue (Merck Rf. 13741). To study the ascus structure, Lugol's solution was added to sections and squash preparations after pre-treatment with 10% KOH.

The descriptions presented below are based on both original descriptions (Fritze & Ilse 1870, Sipman 2007, Werner 1958) and our own observations.

For secondary metabolite study, high performance thin-layer chromatography (HPTLC) was performed in accordance with Arup et al. (1993), using a CAMAG Nanomat 4 sample applicator and CAMAG Horizontal Development Chamber.

Taxonomy

Aspicilia albosparsa (Werner) S.Y. Kondr., Ukr. bot. Zh. 59: 603 (2002) Fig. 1

≡ *Lecanora albosparsa* Werner, Bull. Soc. Bot. France 105: 241 (1958).

Typus: Syrie, roches volcaniques du littoral près Banias, 27.8.1938, *R.G. Werner* (BC!-**lectotypus, hic designatus**; BC!-isolectotypus).

Key Characters— Thallus usually sterile, epilithic, crustose (becoming semi-umbilicate occasionally) and squamulose, with dirty green to ochraceous brown colours, with dominancy of white pseudocyphellae on the surface; hymenium rather shallow to medium, up to 125 µm, with non-moniliform paraphyses; conidia rather short (6–9 µm); secondary metabolites absent.

Description— Thallus epilithic, crustose, sometimes becoming semi-umbilicate (only seen in the collection locality from Uşak!), areolate-effigurate, marginal lobes up to 2 mm long and slightly ascending, flat to slightly convex, dirty green to ochraceous brown, epruinose; pseudocyphellae dominating the surface, white, 1 to 8 in each areole, at first punctiform than becoming elongated and joining into sinuous, branched lines; cortex unistratose, paraplectenchymatous, constructed of perpendicular and moniliform hyphae, up to 50 µm tall, outer part up to 25 µm brown; soredia and isidia absent; prothallus not visible. Ascomata rare, with a black disc, at first punctiform and concave, then slightly convex and up to 1 mm in diam.; excipulum hyaline, up to 30 µm broad, I–; hymenium 75–125 µm tall, hyaline, I+ blue; epihymenium *Aspicilia*-green, N+ green to blue-green; hypothecium distinct, shallow, to 40 µm tall, hyaline, without algae, I–. Asci clavate, *Aspicilia*-type, 75–85 × 19–25 µm, usually sterile; paraphyses septate, simple or branched, 2.5 µm broad, apical cells swollen, up to 3.8 µm; mature ascospores not seen. Conidia straight or slightly curved, 6–9 × 1.3 µm.

Secondary metabolites— None detected by HPTLC. Spot tests K–, C–, KC–, Pd–.

Distribution and ecology— This xerophytic species, known from Syria and Turkey (Fig. 2), is perhaps common in the Eastern Mediterranean. It grows on sun-exposed calcareous rocks up to 1700 m altitude in the eu-mediterranean to the mediterranean-montane belt.

Additional specimens examined— **Afyon**, between Çağlayan & Keklicek villages, 1st km, Kıraç Mountain, 38°10.26'N, 30°10.48'E, 1140 m, 25 June 2009, *A. Şenkardeşler* (*EGE 39726*); between Muratli & Keklicek villages, 1st km, Kıraç Mountain, 38°10.10'N, 30°08.67'E, 1490 m, 25 June 2009, *A. Şenkardeşler* (*EGE 39728*); between Pazarağaç & İnli villages, 5th km, 38°31.80'N, 30°49.38'E, 1060 m, 25 May 2010, *A. Şenkardeşler* (*EGE 39728*); **Batman**, "in valle Sassun districtus Bitlis, ad rupes prope vicum Goro" [on rock probably in environs of Sarıyayla village], 1700 m, 12 Aug. 1910, *H.F. von Handel-Mazzetti* Nr. 3305 (*W 1929-15489*); **Elazığ**, near Göldschik (=Gölcük) village, at subsaline lake with same name (source of western Tigris), 1350 m, 28 July 1910, *H.F. von Handel-Mazzetti* Nr. 2543 (*W 1920-00704*); **Şirnak**, Dschesiret-ibn-Omar (Cizre), ca. 400 m, 21 Aug. 1910, *H.F. von Handel-Mazzetti*

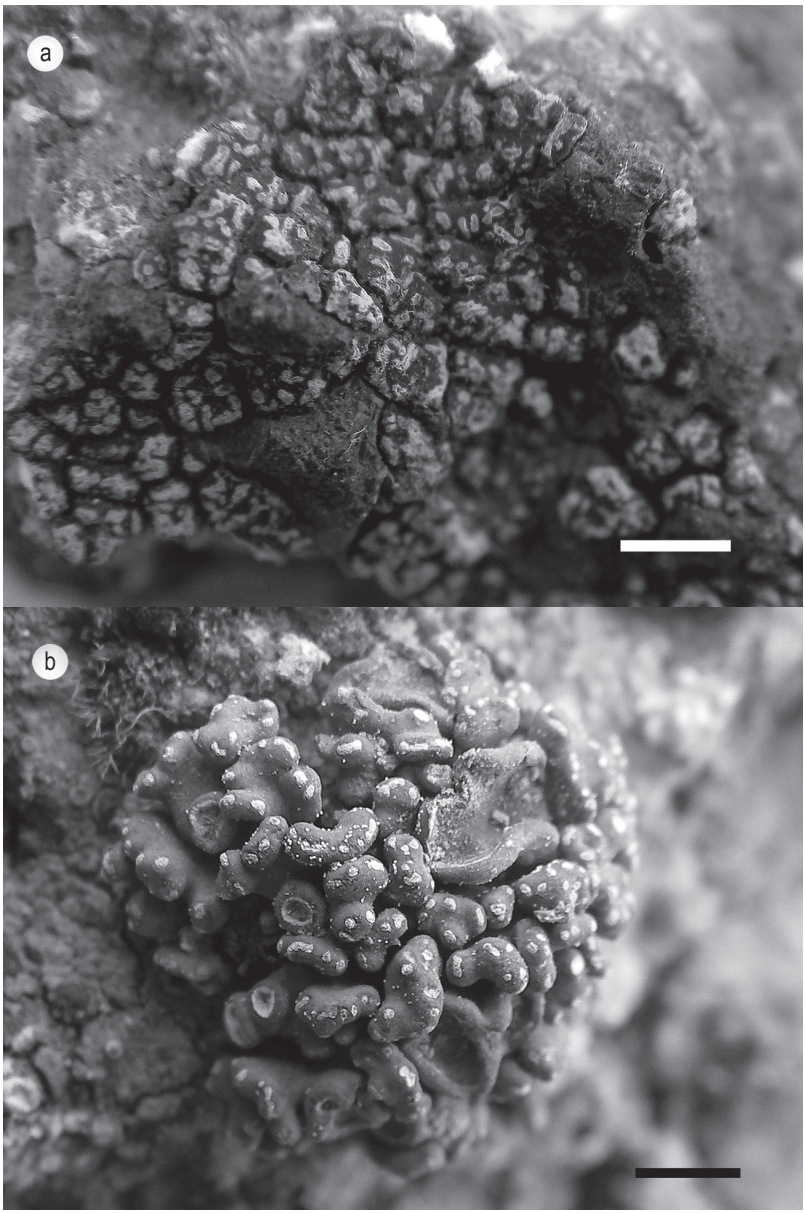

Figure 1: *Aspicilia albosparsa*. (a) Lectotype: white, punctiform to jointed pseudocyphellae dominate the surface of the crustose thalli (*BC*); (b) Semi-umbilicate form with mainly punctiform pseudocyphellae (*EGE 39729*); scale bars = 2 mm.

Nr. 3082 (*W 1929-15643*, *WU 41317*); **Uşak**, between Ormandami & Üçkuyular villages, 3rd km, 38°47.28' N, 29°06.24' E, 920 m, 22 Apr. 2010, *A. Şenkardeşler* (*EGE 39730*).

Remarks— (1) *Aspicilia albosparsa*, which is not included in any identification key, is characterized by a usually sterile, epilithic, crustose (occasionally becoming semi-umbilicate) and areolate-effigurate thallus with dirty green to ochraceous brown colours, a surface largely covered by conspicuous white pseudocyphellae, a rather shallow to medium (≤ 125 µm thick) hymenium with non-moniliform paraphyses, rather short conidia (6–9 µm), and the absence of secondary metabolites.

(2) The species is morphologically similar to *A. maculata* (H. Magn.) Oxner, *A. sphaerothallina* (J. Steiner) Szatala, and *A. syriaca* (J. Steiner) Szatala. *Aspicilia albosparsa* differs from these species by one or more of the following characters: white pseudocyphellae, shorter conidia (8–12 µm in *A. maculata*, 7–13 µm in *A. sphaerothallina*, and 8–15 µm in *A. syriaca*) and a shallower hymenium (100–120 µm in *A. maculata*, 140–190 µm in *A. sphaerothallina*, and 140–180 µm in *A. syriaca*).

(3) Specimens seen in the Natural History Museum in Vienna (W) and the University of Vienna Herbarium (WU) in 2007 and 2008 were labeled "*Lecanora (Aspicilia) pseudocyphellata* J. Steiner", a perfect name reflecting its main key character but one that was never published. In 2009 the author found a suitable type in the herbarium of Guy Roger Werner (BC), labeled as *Lecanora albosparsa*, which was later transferred to *Aspicilia* in Kondratyuk & Zelenko (2002).

(4) The localities of the specimens collected by H.F. von Handel-Mazzetti cause problems, because many village names are no longer in use or unusually spelt. A map deposited in W provided some information about these localities. The locality "Goro" lies about 50 km east of Bitlis province; this information directs the author to the surroundings of Sarıyayla village within Batman province. The locality "Göldschik" corresponds to the present village Gölcük in Elazığ province; the lake indicated in the label is currently called Hazar Lake, lying just east of Gölcük. Dschesiret-ibn-Omar is the former name of Cizre village in Şırnak province.

Protoparmeliopsis klauskalbii (Sipman) Şenkard., **comb. nov.** Fig. 3

MycoBank MB 518655

≡ *Lecanora klauskalbii* Sipman, Biblioth. Lichenol. 96: 270 (2007).

Typus: Greece, W Aegean, Nomos Evvias, Eparchia Karistias, S Evvia, Aetós, alt. ca. 20 m, schist rock outcrops along the coast and in phrygana, 23.09.2005 H. Sipman & Th. Raus no 54654 [B-holotype].

Key Characters— Thallus placodioid, brown, without pruina; areoles with white margins and non-swelling lobes with black lower side; apothecia with

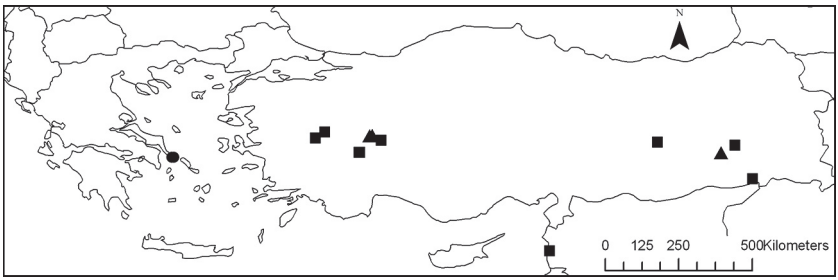

Figure 2. Distribution of *Aspicilia albosparsa* (■) and *Protoparmeliopsis klauskalbii* (▲= Specimens examined, ●= Locality cited in Sipman 2007)

brown discs; lecanoric acid present (in Turkish specimens) (C+ orange to reddish), usnic and norstictic acids absent (K–, KC–).

Description— Provided by Sipman (2007).

Secondary metabolites— Zeorin, lecanoric acid and unknown fatty acids. Spot tests K–, C+ orange to reddish, KC+ orange to reddish, Pd–.

Distribution and Ecology— This species, known from the Aegean island of Evvia (Greece) and three localities in the western and eastern central highlands of Turkey (Fig. 2), is probably widespread throughout the eastern Mediterranean.

Specimens examined— **Afyon**, between Ataköy & Küçükkalecik villages, 2nd km, Kumalar Mountains, 38°40.99' N, 30°32.78' E, 1140 m, 23 June 2009, *A. Şenkardeşler* (*EGE 39731*); between Büyükkalecik & Kocatepe villages, 3rd km, Kumalar Mountains, 38°40.06' N, 30°28.30' E, 1700 m, 23 June 2009, *A. Şenkardeşler* (*EGE 39732*). **Diyarbakir,** near Goro village [close to Çatakköprü village] in Sassun valley, ca. 700 m, 08 Aug. 1910, *H.F. von Handel-Mazzetti* Nr. 3308 (*WU 41350*, labelled as *Lecanora riparia*, published in Steiner (1921); specimen attached with a note of Bruce Ryan in 1992 as "Holotype of *Lecanora steineri* ined.". *W 1929-15537*, labelled as *Lecanora riparia*, published in Steiner (1921); specimen annotated by Bruce Ryan in 1992 as "Isotype of *Lecanora steineri* ined.").

Remarks— (1) *Protoparmeliopsis klauskalbii*, not yet included in any identification key, differs from *Lecanora graeca* J. Steiner and *L. placentiformis* J. Steiner by the absence of norstictic acid and from other placodioid species of *Lecanora* Ach. and *Protoparmeliopsis* M. Choisy by the absence of usnic acid and the presence of lecanoric acid. It differs from related species known from Turkey and adjacent regions by the combination of a brown thallus with white areole margins, non-swelling lobes, and a black underside. *Lecanora bolcana* (Pollini) Poelt, *L. dispersoareolata* (Schaer.) Lamy, *L. garovaglii* (Körb.) Zahlbr., *L. graeca*, *Protoparmeliopsis achariana* (A.L. Sm.) Moberg & R. Sant., *P. laatokkaensis* (Räsänen) Moberg & R. Sant., *P. macrocyclos* (H. Magn.) Moberg & R. Sant., and *P. muralis* (Schreb.) M. Choisy are not brown and their areoles lack white margins; unfortunately, old herbarium material of these 8 species

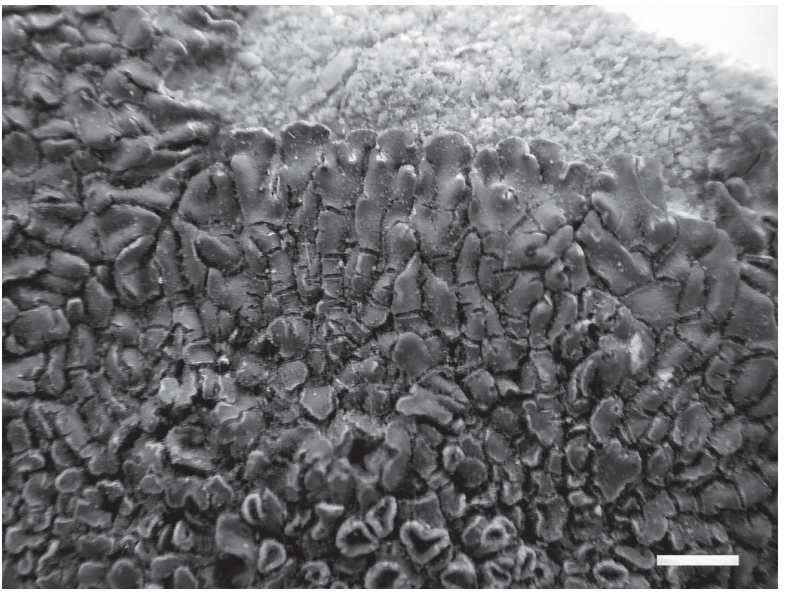

Figure 3: *Protoparmeliopsis klauskalbii*. Thallus margin (W *1929-15537*); scale bar = 2 mm.

often becomes brownish, so that TLC/HPTLC analyses become necessary to differentiate them from *P. klauskalbii*. *Lecanora placentiformis* is also brown but its areolar margins are not white.

(2) The Turkish material seems to deviate by the presence of lecanoric acid, a substance not reported by Sipman (2007).

(3) Choisy (1929) briefly described the genus *Protoparmeliopsis* as having a placodioid and submembranous thallus with hypothecium containing photobionts ["Thalle submembraneux, lacinié divisé au pourtour, straminé, apothécies vulgairement pénétrées par les gonidies dans l'hypothécium."]" and as type species proposed *P. muralis*, which has long (≤ 25 µm), curved pycnoconidia. Hafellner & Türk (2001) and Santesson et al. (2004) have recently proposed many new combinations, and the genus has been accepted in numerous local floristic studies. According to Sipman (2007), *P. klauskalbii* is closely related to *P. muralis* and fits well in *Protoparmeliopsis* even in a narrower concept of the genus. Therefore we do not hesitate to propose this new combination even in the absence of one generic character—the straw-like colour (presence of usnic acid). Other transfers to *Protoparmeliopsis* will be made in future papers.

(4) Steiner used the name *Lecanora riparia* (Flot.) J. Steiner for specimens related to "*Lecanora muralis*" with a brown colour and whitish margins,

conspecific with *P. klauskalbii* (specimens seen by the authors in W and WU). However, this name is not applicable because the type specimen is from Central Europe, where *P. klauskalbii* does not occur. Bruce Ryan, who reinvestigated these specimens using TLC and annotated some as "*Lecanora steineri* B. Ryan ined.," died before he could publish his species. Later, Sipman (2007) realized that the usnic acid-lacking, brown, white-margined specimens collected in Greece should be treated as a distinct species, for which he proposed the name *Lecanora klauskalbii*.

(5) As mentioned above, recognition of the collection localities of H.F. von Handel-Mazzetti is problematic. The map deposited in W situates "Batman Köprü" about 15 km east of Mejafarkin (currently known as Silvan). It is inside the province of Diyarbakır, close to the border with Batman, a location that matches the current environs of Çatakköprü.

Ramalina carpatica Körb., in Fritze & Ilse, Verh. Zool.-Bot. Ges. Wien 20: 501 (1870).

TYPE: "Mittelgrat", Vysoké Tatry, Slovakia, 1863, leg. Hausknecht & Fritze [W? not seen].

KEY CHARACTERS— Thallus epilithic, erect, with distinctly blackened branch tips, lacking soredia, isidia and pseudocyphellae; apothecia apical, occasionally blackening like the tips of branches; ascospores kidney-shaped.

DESCRIPTION— Thallus epilithic, shrubby, tufted, erect, up to 9 cm high; branches usually single, thick, smooth to unevenly pitted, hollow, cylindrical or rarely flattened at the base, not dorsiventral and not filamentous; soredia, isidia and pseudocyphellae absent; tips of the branches distinctly blackened; cortex plectenchymatous of perpendicular hypes, thin, indistinct, overlaying a strongly developed and cylindrical zone of prosoplectenchymatous tissue including the photobiont zone; photobiont trebouxioid. Ascomata apothecia, frequent, apical, partly blackened, shortly stalked, disc pale green or blackened. Asci elongate-clavate, *Bacidia*-type, 8-spored. Ascospores 1-septate, kidney-shaped, colourless, 11–16 × 5–7 µm.

SECONDARY METABOLITES— None detected by HPTLC. Spot tests K–, C–, KC–, Pd–. Earlier studies report evernic, obtusatic and usnic acid for this species (Culberson 1970). Our material seems to belong to a deficient strain.

DISTRIBUTION AND ECOLOGY— This species, previously known only from Poland to Greece in the Carpathian Mountains and the Balkans (Keissler 1959, Abbott 2009), is reported here for the first time from Turkey. It is a saxicolous species from wind-exposed cliffs of acidic silicate rocks.

SPECIMEN EXAMINED— **İZMIR**, Bozdağ Mountains, between YILANLI & DOKUZLAR VILLAGES, 1st km, 38°18.22' N, 28°07.45' E, 2063 m, 11 May 2009, *S. G. Şenol*, conf. O. Blum (*EGE 39733*).

Remarks— (1) *Ramalina carpatica* is easily recognizable at first glance by its habit on siliceous rocks and its blackening tips and apothecia. The collected specimens, reaching up to 9 cm tall, are the longest reported for this species.

(2) The identification of this species was confirmed by Prof. Dr Oleg Blum (Kiev).

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Literature cited

Abbott BFM. 2009. Checklist of the lichens and lichenicolous fungi of Greece. Biblioth. Lichenol. 103. Berlin/Stuttgart. J. Cramer Verlag.

Arup U, Ekman S, Lindblom L, Mattsson J-E. 1993. High performance thin layer chromatography (HPTLC), an improved technique for screening lichen substances. Lichenologist 25(1): 61–71. doi:10.1006/lich.1993.1018

Choisy M. 1929. Genres nouveaux pour la lichénologie dans le groupe des Lecanoracées. Bull. Soc. Bot. France 67: 521–527.

Culberson CF. 1970. Supplement to "Chemical and Botanical Guide to Lichen Products". Bryologist 73: 177–377. doi:10.2307/3241261

Fritze R, Ilse H. 1870. Karpaten-Reise. Gemeinschaftlich ausgeführt im Juli und August 1868 und beschrieben. Verh. K.K. Zool.-Bot. Ges. Wien 20: 467–526.

Hafellner J, Türk R. 2001. Die lichenisierten Pilze Österreichs – eine Checkliste der bisher nachgewiesenen Arten mit Verbreitungsangaben. Stapfia 76: 1–167.

Kondratyuk SY, Zelenko SD. 2002. New lichens and lichenicolous fungi from Israel and the Near East. Ukr. Bot. Zhurn. 59: 598–607.

Keissler K. 1959. *Usneaceae*. 321–480, in Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Österreich und der Schweiz. IX. Band, 5. Abteilung, 4. Teil, Lieferung 3. Leipzig, Akademische Verlagsgesellschaft Geest & Portig.

Santesson R, Moberg R, Nordin A, Tønsberg T, Vitikainen O. 2004. Lichen-forming and lichenicolous fungi of Fennoscandia. Uppsala, Museum of Evolution, Uppsala University, Uppsala.

Sipman HJM. 2007. New lecanoroid lichens from Greece. Bibliotheca Lichenologica 96: 267–277.

Steiner J. 1921. Lichenes aus Mesopotamien und Kurdistan sowie Syrien und Prinkipo. Ann. Naturhist. Mus. Wien 34: 1–68.

Werner RG. 1958. Notes de lichénologie libano-syrienne. V. Bull. Soc. Bot. France 105(5–6): 238–243.